

ARIZONA ANTIQUE RADIO CLUB NEWS



Vol XVIII, No 2 Summer 2001

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**THE RADIO OBLITERATOR
SPELLS DEATH TO RADIO-
CONTROLLED DEVICES.**

ARIZONA ANTIQUE RADIO CLUB NEWS

Vol XVIII, No 2 Summer 2001



Arizona Antique Radio Club

www.azarc.org

The Arizona Antique Radio Club was organized in 1983 for the preservation of the history and artifacts of radio and television, and for the advancement of knowledge and appreciation of radio technology and communication. The Club is a non-profit corporation organized primarily for the mutual assistance of radio devotees and collectors in Arizona. Membership, however, is open to any persons who have an interest in radio and television history, preservation, restoration, and collecting.

Meetings are held from October through May and consist of touring collections, presentations of technical, historical or restoration information, thematic displays of radios and the autobiographical experiences of the members. Our antique radio Swap Meets are scheduled for Spring and Fall meetings. Members of the Board of Directors are elected at the annual business meeting in May. Most meetings are held on Saturdays in the Phoenix and Tucson areas, and when possible, elsewhere within Arizona.

Membership dues are \$18 (individual) or \$20 (family) per calendar year and provide access to all club benefits including the quarterly issues of the *Radio Club News*. Send dues or membership inquiries to: **Arizona Antique Radio Club, 10513 E. Clinton, Scottsdale, AZ, 85259, phone (602) 860-8951.**

The Arizona Antique Radio Club News is the quarterly publication of the Arizona Antique Radio Club, Inc. It is mailed First Class to current members.

Contributions: submission of articles, news items, fiction, photographs and other materials relating to radio history and collecting are greatly appreciated, particularly if they have an Arizona connection. All members are encouraged to broaden their interest in the hobby by sharing their experiences, opinions, knowledge and observations with the club through its publication. Send materials for publication to **Arizona Antique Radio Club, 2025 E. LaJolla Dr., Tempe, Arizona, 85282-5910. Phone is 480-730-6058. Email: lettow@yahoo.com.**

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2001 ~ 2002 Calendar of Events

OCTOBER ANTIQUE RADIO PAPER COLLECTIBLES AND FAMILY POTLUCK

When: Saturday, **October 13**,
4pm.

Where: Home of Cal Lidback, 440
S. 31st St, Mesa.

We'll start the new radio club year with our popular potluck in the spacious Lidback yard. Bring your significant other and family and something for the potluck, we will provide hotdogs and drinks.

Clyde Watson will present a program on paper radio collectibles: books, magazines, advertising, manuals, brochures, etc. We'll have space for you to bring your interesting examples. The club has never had a meeting on this topic before so this should be quite a meeting.

Contact: Dave Lambert, phone and email on page 2.

NOVEMBER 19th ANNUAL FALL SWAP MEET

When: Saturday, **November 3**,
8am.

Where: Antique Electronic Supply,
Tempe.

Our first swap meet of the season to buy and sell all the stuff members have been accumulating and fixing

up all summer.

As usual the starting time will be 8am and it will be strictly enforced. For buyers, the swap meet is open to the general public, however **YOU MUST BE AN AARC MEMBER TO SELL AT THE SWAP MEET.** In the past we have charged non-members half the cost of membership to sell, but we have come to realize that membership dues are what keeps the club going and we need all the members we can find to keep the club vital. We will have membership applications and renewal forms available for you at the meet.

There will be hotdogs and an auction around 10am, with 10% of each sale going to the club. Reserve bids will be allowed.

Any items you would like to donate to the club for auction would be greatly appreciated. Generous contributions of items in past years has been a big help to the club treasury.

Contact Larry Kenan or Carl Roberts, phone and email on page 2.

DECEMBER MARK TOPPO's COLLECTION

When: Saturday, **December 8**,
1pm.

Where: Home of Mark and Lynn Toppo, 5127 W. Kings Ave., Glendale.

What has the club's most active collector added to his wall of fame?

Please bring a chair - you'll have to sit down after you see Mark's radios!

JANUARY

TUCSON SWAP MEET

When: Saturday, **January 26**, 2002, 8am.

Where: Dave's Antiques, 3210 S. Dodge, #11, Tucson.

It hardly ever rains in Arizona, but last year this event was marred by a freak storm. The southern Arizona members have gone too long without a swap meet so this one should be the best ever.

Contact Steve Smith, phone and email on page 2.

FEBRUARY

EIGHTH ANNUAL RADIO ROUNDUP

When: Saturday, **February 23**, 2002, 1pm.

Where: to be announced.

We get together to create a massive display and contest of radios based on a theme. This year's theme: House Brands. Time to bring out the Silvertones, Airlines, Western Autos, Coronados, etc. Surprise us with your examples of this neglected area of radio collecting.

Contact George Fathauer or Jeff Thomas, phone and email on page 2.

MARCH

SPRING SWAP MEET

When: Saturday **March 16**, 2002, 8am.

Where: Antique Electronic Supply, Tempe.

Our spring swap meet is one week after the Scottsdale Hamfest which is

on March 9. Dennis Craft is looking for volunteers to do some kind of antique radio display at the hamfest. Contact Dennis if you can help.

APRIL

THE MARTIN BERGAN COLLECTION

AND

ANNUAL AARC BUSINESS MEETING

When: Saturday, **April 13**, 2002, 1pm.

Where: Home of Martin Bergan.

The long anticipated visit to Martin's collection, without exaggeration one of the world's best. Absolutely not to be missed. This meeting is open to Club members and their guests only. Not open to the general public.

MAY

TO BE ANNOUNCED

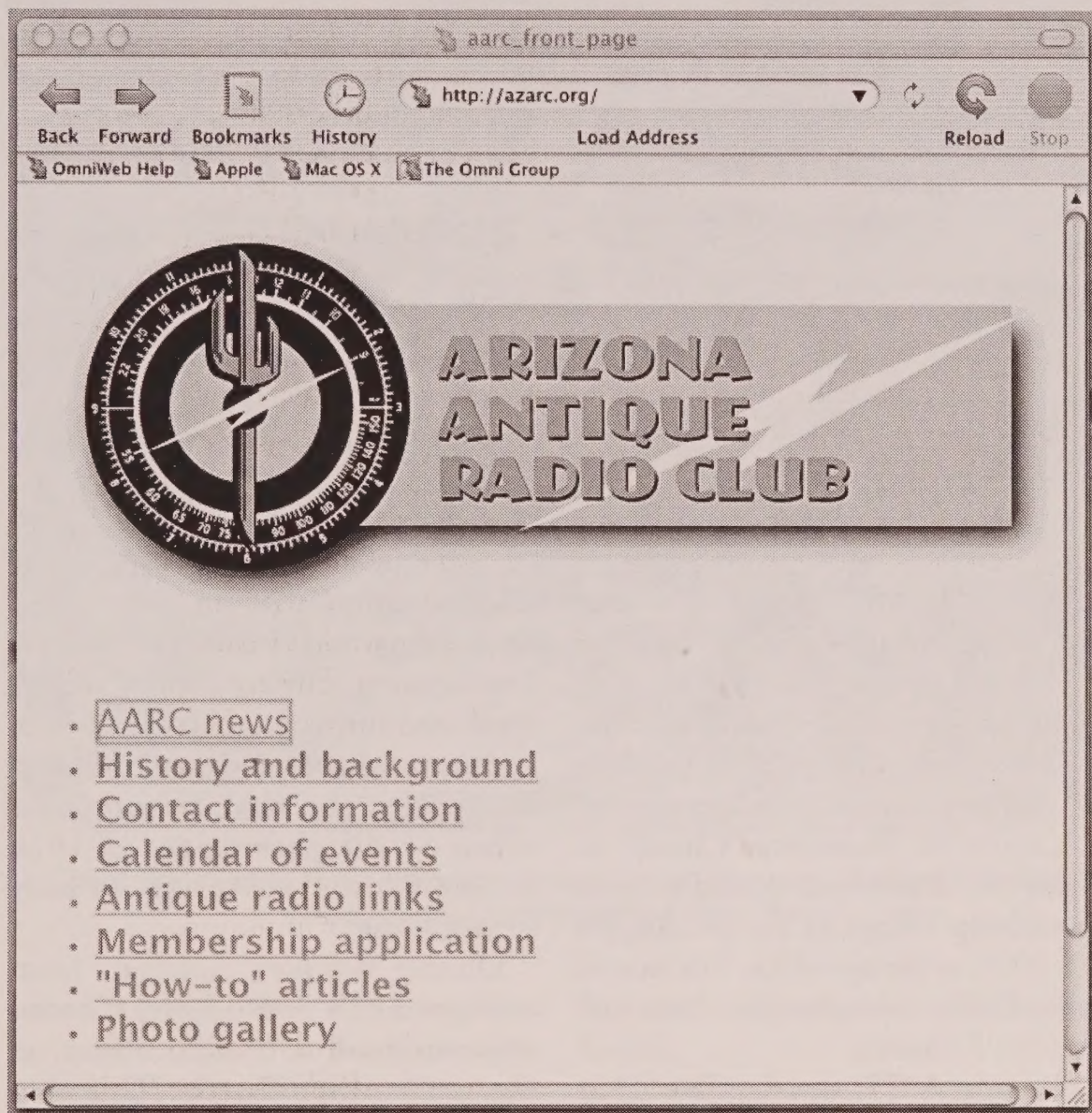
When: Saturday **May 11**, 2002.

Details to be announced.

E-MAIL and MEMBERSHIP REMINDER

Please, if you have not received e-mail notices of recent meetings and you would like to, send your e-mail address to Secretary Dennis Craft at dcraft@qwest.net. Also send Dennis any changes you may have in your e-mail or physical addresses.

Another reminder: if you are aware of antique radio enthusiasts who have allowed their memberships to lapse, or have never joined the club, urge them to join up now. Our postage and insurance costs have risen this year and we need to increase membership to offset these increases. Radio collecting is more than eBay!



AZARC.ORG Now Open

Our new website is now up and running. We have an officially registered domain name, azarc.org, and an official webmaster, Jeff Shields.

On the site you'll find the latest meeting schedule, club news and membership application. This will be your source for Club information between issues of the quarterly journal. Jeff has compiled a huge list of links to other radio sites and a wealth

of information about the club.

In the future we hope to have some articles from the more rare issues of the *Radio Club News* and a membership database.

Jeff is looking for photos to post in the gallery section of the site as well as contributions of other useful items. Visit the website for details and while you're there, sign the guestbook. 📷

HONORARY LIFE MEMBER CHARLES M. BRELSFORD

1907 - 2001

BY CLYDE WATSON

By the very nature of our shared interests, our club membership has been very dependent upon our older members and a sharing of their experiences. So it is always a true loss when yet another of our valued colleagues passes away, particularly as he has been an exemplar of a life well lived and a character defined by intelligence, integrity and generosity.

Charles M. Brelsford, "Chuck" to those who knew him, passed away at Friendship Village in Tempe, August 23, 2001, at the age of 93. His second wife, Doris, had preceded him just this last February.

Born in 1907, young Charles in 1916 helped his brother, Ernest, set up a spark transmitter. By 1923 he had achieved his first radio operator license as 8BMU; later he was to also hold the call signs of W8WW, W2CTA and K2WW.

In September of 1925, he entered Denison College, at Granville, Ohio, as a freshman. There with his brother, Ernest, who was also enrolled, they were able to operate wireless equipment that had been set up by one of their physics professors, Richard H. Howe. The wireless station on campus was set up for both CW for amateur transmission and with a

tube transmitter for voice to serve as a broadcast station, WJD. Chuck was allowed to use the amateur equipment and collected many QSOs over his four years at Denison. In addition, he participated in some of the broadcasting efforts of WJD, such as sport and musical events. However, because of the infrequency of station broadcasts, the station was closed down by the government in 1926 ending Charles' adventures in early broadcasting.

During summer vacations from college, 1928 and others, Charles was employed as a radio officer on the cruise ship, Tioesta. This ship made nine day trips between Buffalo and Duluth on the Great Lakes, with stops in between. With the other radio operator, in addition to sending and receiving messages both for ship and passengers, they would copy news items at night, type and then print them as a four-page newspaper which they would sell to the passengers each morning.

In the early 1930s, Charles became a secretary/assistant for either or both Harvey Firestone, Sr. and Harvey, Jr. In January of 1935, Harvey, Jr. sent Charles to a rubber plantation the company had recently started



Chuck Brelsford at the Electronic communication Museum, Antique Wireless Association, East Bloomfield, New York.

near Duside, Liberia. Charles was to serve as secretary to the plantation manager, and as a relief radio operator. Charles returned to the states in 1936, but before returning he had greatly assisted in upgrading the plantation's radio station for better communication with the home office in Akron, Ohio, and business connections in Liberia. Liberia had no telephone services in those years so the need for a dependable station was great for both local and trans-Atlantic communication.

In 1940, Charles went to work for Eastman Kodak in Rochester, New York. In 1972, after 32 years of service, Chuck retired from his position as business manager of the

Research Laboratory of Eastman Kodak.

Always active as a ham he served, during his years at Eastman, as a radio operator for Munroe County of New York. He represented Rochester on the Eye Emergency Network, and served a term or so as president of the Rochester Amateur Radio Association.

At a meeting of the Rochester association in 1953, Chuck met Bruce Kelly. The year before, Bruce, who had amassed quite a collection of radios, along with Lincoln "Linc" Cundall and George Batterson had formed an organization which was to be known as the Antique Wireless Association (AWA). Both Bruce and

Linc were industrial engineers with Eastman Kodak, while George owned a trucking company.

Charles quickly became involved with this group as they proceeded to establish a museum, gather memberships, help get out the *Old Timer's Bulletin*, and hold meetings or conferences. A large segment of credit for the existence of the AWA museum, undoubtedly, should go to the efforts of Charles. By the 1960s, Charles was serving as vice president of the association with George Batterson as president. Then in 1972, Charles was elected as the second president of AWA and served for 11 years, until 1983. At that time he was given an honorary membership award by the Antique Wireless Association.

During this time, and particularly when serving as president, he was pleased with the many opportunities that came his way to meet historical figures of radio or of close family members. One of his cherished memories was when he and Doris drove to the home of Clarence Tuska as Tuska retired from the patent office of RCA to receive Tuska's gift to the museum of a complete collection of the IRE Proceedings. (Tuska, among other activities, manufactured radio sets for a while, which now are quite rare.)

In 1984, Charles and Linc Cundall did the planning and supervising of the building of the first of the museum's annexes. Later in 1996, a second annex was added to house what has become an extraordinary collection of radio artifacts and literature. In leaving the area, Charles

donated to the museum, among other items, a beautiful Leutz receiver he had acquired and the 1-kw synchronous spark transmitter that had been used at Denison College.

In July of 1987, after a long search around the country, Charles and Doris decided to live the rest of their retirement years at Friendship Village in Tempe. The Arizona Antique Radio Club had been in existence for four years, and Chuck quickly became a member and active participant in the club's activities.

With our club, he served as vice president for a term, gave presentations at our meetings, wrote articles for our journal, and represented AARC with AWA. In October of 1996, in recognition to his many contributions to the club he was awarded an Honorary Life Membership. In 1999, the Quarter Century Wireless Association honored him for holding an amateur license for 75 years.

In the most recent years, his activities had become quite curtailed by pulmonary fibrosis. Old friends missed seeing him at our meetings, although some of us tried to visit him on occasion. Of loss also was the opportunity that many newer members might have had to know and appreciate his personal involvement in radio and AWA. More extended knowledge of Chuck can be gained by consulting the new journal index that will be published soon. In the Index, you will find guidance to the various articles Charles wrote of his experiences.

In making a personal judgement

of Charles and his interests in radio, it appears to this writer that Charles was a bit different from many of our members and their interests. He did not seem to have the interest of a collector, at least not an avid one. Nor did he seem to thrill to the chase of electronic glitch or better circuitry; nor hold a desire to restore. He seemed most attracted to radio as a means of communication, noting his active involvement as a ham, and the intellectual understanding of radio, its development and history. I have to believe that Charles' greatest

contributions to AWA and to our own AARC was his organizational and business skills. I would have to believe that it was his business and personal skills that made him most valuable to the founding and existence of AWA in particular.

Those of us who had the privilege of knowing Chuck will miss him greatly.

Charles is survived by a son, William M. Brelsford, K2DI, of Prescott, Arizona, a stepson, a stepdaughter, nine grandchildren and nine great-grandchildren. ☪

WTF de ELF

Akron, Ohio, USA from Duside, Liberia, West Africa

by Charles M. Brelsford, K2WW

This article originally ran in the Winter 1990 issue of the Radio Club News.

Reading about the current (1990) civil war in Liberia, I thought about the years 1934 to 1936 when I worked there at the Firestone rubber plantation. In January 1934, Harvey Firestone, Jr. sent me to Liberia for two years to serve as secretary to the plantation manager and as relief radio operator for three months while the regular operator was on vacation. There were no airplanes flying to Liberia so I sailed on the freighter Padnsay, a three week trip.

I took with me an REL shortwave receiver and could listen from the ship to the Akron-Liberia circuit, shortwave broadcasts and amateurs. This little receiver was in a metal box with batteries inside. It was a nice set and I have never seen another one like it since.

Harvey Firestone established the plantation to offset the then monopoly of the rubber supply in the Far East. In 1934, Firestone had some 10,000 acres of new rubber trees planted and growing, mostly at Duside, but with another smaller plantation at Cape Palmas. By 1936 regular shipments of crepe rubber

and latex were being sent to Akron from these two plantations.

Firestone installed a 1.5 kilowatt radio code transmitter at the Duside plantation in Liberia with power supplied by a generator. The transmitter contained air-cooled tubes in a MOPA circuit. The antenna was a single wire between two 50' poles. The station was assigned an internationally clear frequency on approximately 8 MHz, or just under 40 meters. The frequency was between two powerful British and French stations and there was no QRM. An educated native Liberian ran the generator and transmitter while the station was on the air.

Located in a separate building, the receiving equipment was very simple. It was a regenerative detector with one stage of audio amplification. The antenna was a Beverage antenna running through the rubber trees for a quarter mile six feet above ground. This antenna, with the sensitivity of the regenerative detector, provided a good signal. One stage of audio was ample for headphone operation. The operator copied messages directly on a typewriter.

The scheduled starting time was 7:00 p.m., Liberian time, it being 2:00 in Akron. Once the operator established communication he would continue until all messages had been sent and received or until the radio signals faded out. This would perhaps be 2:00 to 5:00 in the morning.

At the start, after a short call, if the Akron station were not heard, the operator would send a series of "VVV de ELF" until signals were heard from

Akron. Depending upon propagation this might be for 30 minutes to an hour. In order to avoid sitting at the key sending "V's" for such a long time, I rigged up an Omnigraph-like sending wheel with notches cut in the perimeter to send VVV de ELF. So-called "break-in" operation was possible. This meant one could hear the Akron signals in between any dots and dashes of the Duside transmitter. At any time if the receiving operator wanted the sending operator to stop and repeat a letter or word he would touch his sending key to signal the other operator to stop.

Usually our sending was at a speed of 15 to 18 words per minute using a straight telegraph key. When signals were not strong and clear we would send double, i.e., repeat each word. This was especially necessary when sending five-letter code groups. Most of the messages were for Firestone. Occasionally the U.S. State Department, private businesses or mission stations in the country paid for radiograms. The Firestone messages were usually in plain English although there were some five-letter code messages, i.e., RGHTF NJOQD, etc. I coded and decoded most messages for the plantation manager. Firestone business messages included many requisitions for materials and supplies to be shipped from New York. Also, the manager would report to Akron on planting progress of new rubber trees and shipments of rubber. Use of the radio provided a rapid means for exchanging accounting information. Then there was information regarding the travel of personnel to and from

Liberia. On a typical night there might be ten typed pages of incoming and outgoing messages.

Occasionally a magnetic storm would occur and no signals could be heard at night on 8 MHz. I thought another assigned frequency near 19 MHz might get the signals through in the daytime. To try this out I built a temporary transmitter using spare parts and hoisted a vertical curtain type antenna on the poles. At Akron they received the test signals. Shortly thereafter during a "blackout" on 8 MHz, I successfully sent, on the 19 MHz frequency, 2 pages of coded messages for the U.S. State Department. In 1937, after I had returned to the United States, the Collins Radio Company installed a completely new system for Firestone using this higher frequency. They installed V-beam antennas with remote receivers and used high-speed tape machine sending and receiving.

In addition to the schedule with Akron, Duside maintained a schedule on about 3 MHz with a small Firestone plantation at Cape Palmas, Liberia, 250 miles to the southeast.

Another radio system was installed in 1935. There was no telephone system in Liberia. To improve communication between the plantation and the Firestone Bank manager in Monrovia (twenty miles and two hours away) I installed two 50-watt Collins phone transmitters and receivers - one at the plantation office and the other in Monrovia at the home of the manager. They served their purpose well.

In 1934, my brother sent me a

battery model Hammarlund Comet Pro receiver. It was great for listening to music and news from Europe and the U.S.A. In 1936, WLW Cincinnati came on the air with their experimental 500 kilowatt broadcasts. Reception in West Africa was outstanding - just like a local!

In 1936, Firestone presented to Liberian President Barclay an RCA radio-phonograph console. I installed it in the president's home in Monrovia. One major problem was power source. There was a 32-volt battery system in his home so a rotary converter could be used to bring the voltage up to 110 ac. There was also a local lighting system but the line voltages could range from 85 to 130. I installed a saturated type constant voltage transformer and this worked fairly well. However, one night when President Barclay was using the set on the town lighting system a sudden surge of high voltage made an electrolytic capacitor blow out the end cap. This cap then hit and exploded a 25-watt light bulb hanging directly above (the bulb was there to keep the humidity down). Needless to say, President Barclay and his guests were badly frightened. Of course, the set was repaired and worked well thereafter.

In retrospect, I am pleased to have had the opportunity to operate the Firestone-Liberia radio circuit in the days of 1935. It was an experience that cannot be repeated. ♪

LONDON (CALLING

Listening in by Crystal Set by P.A. Kinzie

One of my interests in crystal sets is the improvement of their performance, and the urge is often there to pick up those distant stations with my latest circuit. Some remarkable results have been reported by others, but for many years my own efforts were not very impressive. During the last time that I was in a good location for reception, a small station in Nebraska came in frequently, and was the furthest reception distance that I logged in.

Somehow this did not seem very rewarding. With all due respect to the citizens of Nebraska, it would have been more satisfying to hear a station in a major city at a much greater distance from Kingman, Arizona. In addition to the distance problem, there was a peculiar type of interference that I had never heard before.

An untunable signal often began fading in and out during the early

evening, regardless of what station I was listening to, and when that occurred DX reception was hopeless. Eventually I learned that it was a short wave signal, which is a problem for crystal set listeners living near a high power short wave station. This one was in Spanish, which I assume was located in nearly Mexico. It is said to be a common problem on the east coast, where there are a number of domestic short wave stations.

It was not until I moved to my present home that I realized how well off I had been, even with the lack of distance and with short wave interference. To be brief, reception here is awful, in spite of the fact that it is just a few blocks from the former location. I can barely get out of town most nights, and short wave interference is chronic. There was a difference, however, which I immediately noticed: the interfering station was in English.

At first I simply stopped listening when the interference began, because it overwhelmed the faint signals that I was trying to receive. However, one evening it was already present when I put the headphones on. There was the typical wavering, fluctuating signal, completely untunable as usual. This time a news program was in progress, apparently an interview with a British correspondent, and it was so interesting that I began to listen to it. The interview soon ended and the announcer said that the BBC hourly news was over. I waited for a return to the local station announcer, but the follow-on was a review of the next hour's BBC programing. I

didn't believe it at first, but it was either London or a satellite broadcast coming through on short wave.

Of course this did gain my attention. Over a period of several weeks I tried various tests to see what was going on. With the aid of an ancient signal generator brought back from retirement, I found the transmission to frequency to be about 6.5 MHz. Changing the length of the antenna made little difference. I could count on intermittent night time reception two or three times a week.

Finally, I decided that since broadcast band reception was so bad, I would build a shortwave crystal set to get the good DX that I had been hoping for. Starting with the basics, I designed a high Q short wave coil to place the 6.5 MHz station frequency in the middle of the band, using a tuning capacitor that I had on hand.

The rest of the circuit consisted of a simple no-frills arrangement on a breadboard. Preliminary tests using the signal generator indicated that everything was ok, so I tried it out that night. I heard the London station almost immediately, and now it was a tunable signal.

This was a real "first" for me, but it was a rather ironic first. After all the years of building crystal sets, and getting indifferent results when searching for stations, this time I had found the station first and then built the crystal set to receive it. I still don't know why reception of this one station is so good. It is no one-night-a-year freak condition, and this is a poor location to receive just about everything else. Changes of the antenna and circuitry make little difference, because that signal keeps coming through. 



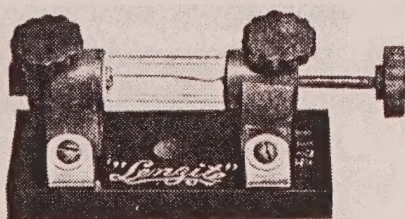
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Patented May 2nd, 1916

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6. "Lenzite," although not permanent, is the only substance that does not lose its efficiency or effectiveness through excessive charges or excessive heat. In fact, it improves with such treatment.
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9. "Lenzite" has the endorsement from Q. S. T., the official organ of the American Radio Relay League.

LENZITE CRYSTAL CORPORATION
537 Chamber of Commerce Building
Pasadena, California

The Radio Obliterator

It Spells Death to Radio-Controlled Devices.



The Latest Marvel of Science, the "Radio Obliterator." Radio-control led

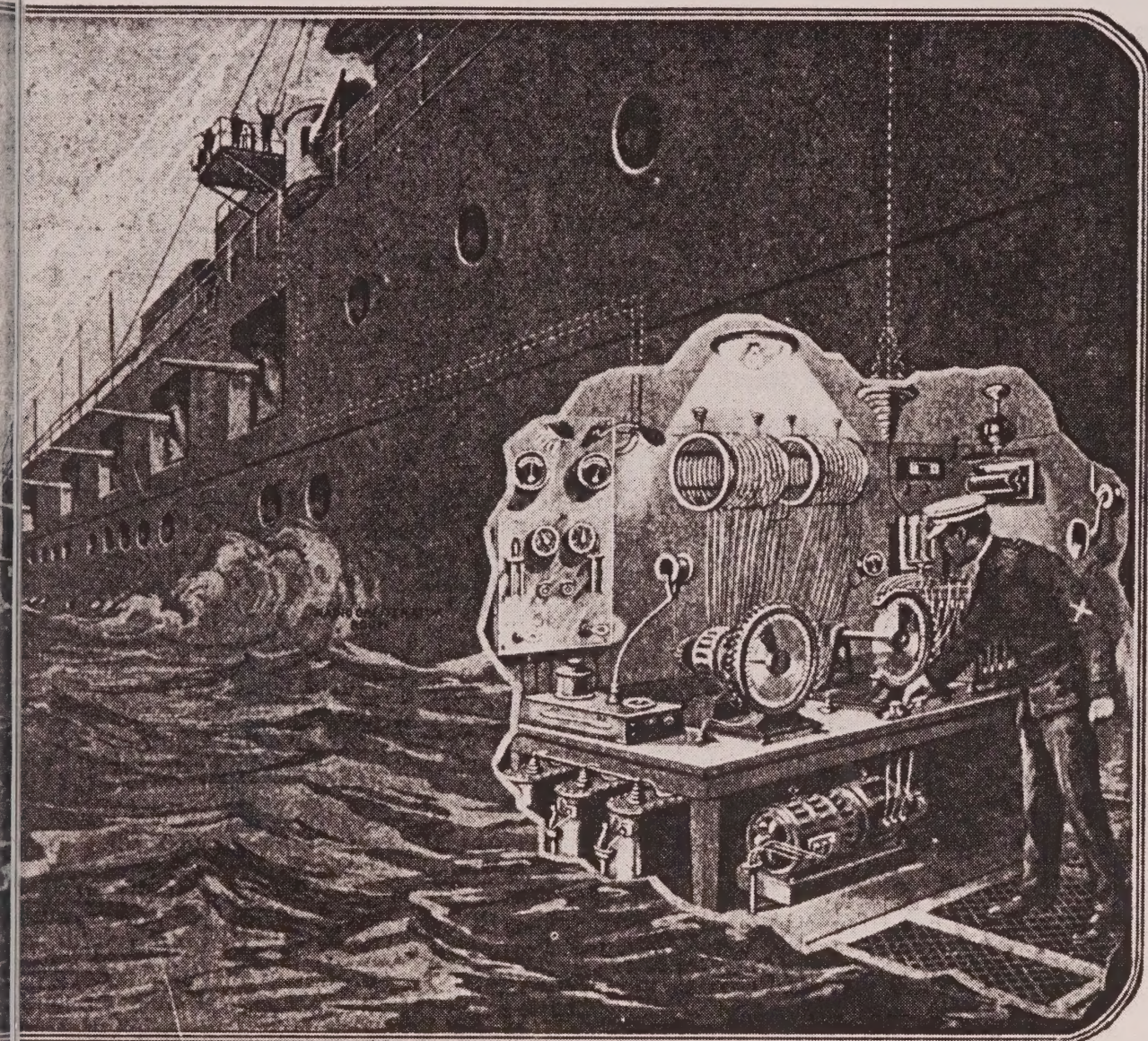
We are all doubtless aware of the wonderful results that John Hays Hammond, Jr., has achieved with his radio-controlled torpedo; in fact, the world has been so amazed by the performance that the United States Government offered him \$500,000 for his device, it is said.

However, to an invention of this

character there are always two sides. One concerns the merits and advantages of the invention, while the other considers its disadvantages and shortcomings. Insofar as the radio-maneuvered torpedo itself is concerned, this has proved in recent tests to possess, apparently, a marvelous and well-nigh uncanny sense of direction.

Attention is now directed, however, to the real efficiency of the invention when put to active service in time of war, when all the cunning and

Reprinted from the January 1917 edition of The Electrical Experimenter, an H. Gernsback publication.



" It Radiates a Perfect Avalanche of Rapidly Changing Wave Lengths, which Spells Failure to All led Torpedoes and Similar Mechanisms, its Inventor Claims.

science of master technicians may be brought to bear on combatting such a demon.

It has been noted as a natural stage in the development of military and naval machines the world over, that as soon as one nation has constructed a new and powerful weapon, then immediately some other nation will exercise every effort to construct a more powerful or combative defensive device. It might be assumed that this is an analogous case.

The Hammond radio-controlled

torpedo has yet to meet exhaustive tests of external wireless interference. As an example:

Let us suppose that a war-vessel discharges such a radio-controlled torpedo, and assume that the enemy ship has observed the dispatch of this deadly missile. Quite possibly it will know that the torpedo is of the radio maneuvered type and the officer on watch will immediately notify its radio operator, who, knowing his technique, causes his wireless transmitter to radiate a composite

wave of many different lengths, thus destroying the effectiveness of the torpedo directed towards his vessel.

It has been learned from an authentic source that the above inventor is employing at present in his radio-controlled device a change in the wave length for controlling his missile, i.e., he employs a sensitive detecting device, tuned by suitable inductances automatically controlled by relays, which inductances control the wave length variations.

Assume, for instance, that the receiver is tuned to 600 meters to operate the explosive charge, 500 meters to start, 800 meters to steer to left, 1000 meters to steer to right and 200 meters to go backwards. These wave lengths are then sent out by the transmitting station on land by merely pressing a certain key, when the impulse of the desired wave length is transmitted and the accurately adjusted receiver will respond to that certain wave length, thus causing the proper mechanism to function, which controls the vessel with perfect ease.

Now if we had a powerful radio transmitter device which would change automatically the emitted wave length from 100 to 10,000 meters, during say one minute, then the radio-controlled affair will be interfered with invariably, as its apparatus will act at every change of wave length, not permitting enough time to cause the controlling mechanism to properly operate and thereby altering the desired course of the boat or its performance.

It may seem impossible on first

impression to build an apparatus for automatically changing the wave length of the transmitter at such a rapid rate as above mentioned, so as to emit different wave lengths and thus produce effective interference. Yet there are people who are working on the subject; notably, Colonel F. P. Cobham, U.S.A., an engineer of national repute who has spent much time and money in developing his Radio Obliterator, an apparatus designed to interfere with any radio-controlled vessel or torpedo which is intended for use in modern warfare.

The U.S. Navy Department is making preparations for a complete test of this device in conjunction with the Hammond radio-controlled torpedo and if the latter will stand the test of Colonel Cobham's Radio Obliterator the Hammond invention will undoubtedly be accepted as a successful and ingenious device.

Very little information can be obtained as to the technical details of Colonel F. P. Cobham's Radio Obliterator just at present. The illustration herewith shows schematically a view of the necessary apparatus. It consists of large helical inductances with numerous leads connected to a rotary switch mounted upon a shaft and revolved by a motor. In front of this inductance a movable contact might be placed so as to press against the convolutions of the inductance, and as the inductance is revolved this contact could be caused to move from left to right and from right to left. As the movable contact moved in or out the inductance effect of the coil would be changed, thus chang-

ing the wave length emitted by the transmitter.

On the same shaft or geared to it, as shown, a suitable automatic switching arrangement is connected which changes simultaneously the condenser capacity, which also helps to change the wave length. The exciting apparatus consists of large, high tension transformers, connected in the usual way to the alternating current supplied thru special protecting devices.

Colonel Cobbam's device has been so cleverly designed that the wave length radiated can be changed from 100 meters to 10,000 meters in the space of one second! The time taken to change the wave length can be increased by reducing the speed of the motor driving the inductance and capacity switches. Thus, by merely controlling the speed, the wave length corresponding to that of the torpedo can be ascertained sooner or later which will interfere with the radio-

JOHN HAYS HAMMOND

The name John Hays Hammond crops up frequently in the early history of radio and electronics, but the name does not have the same public recognition as do the names of Marconi, DeForest and Armstrong. Hammond made many important contributions to the art, more in electronic control rather than in radio communication. Hammond was the inventor of the radio-controlled torpedo, described in the Radio Obliterator article.

Hammond was born in San Francisco in 1888. He spent much of his youth in South Africa, where his father was an engineer for the diamond mines. He returned to the United States in 1900. He attended The Lawrenceville School and Yale's Sheffield Scientific School, completing his education in 1910.

In 1911, with \$250,000 that he

borrowed from his father, he set up Hammond Radio Research Corp. and devoted himself to inventing and conducted experiments in radio guidance. In 1914 he sent his 44-foot pilotless ship on a 120-mile trip with no one on board, which immediately got the interest of the U.S. Navy. Two years later he demonstrated his radio-controlled torpedo.

He continued inventing for the rest of his life, working on, among other things, motion picture synchronization, stereo, and a cosmic ray detector. He was issued 437 patents.

In 1959 Hammond received the Cresson medal from the Franklin Institute and a medal from The Institute of Radio Engineers in 1962.

John Hays Hammond died in 1965.

-Harry Hyder

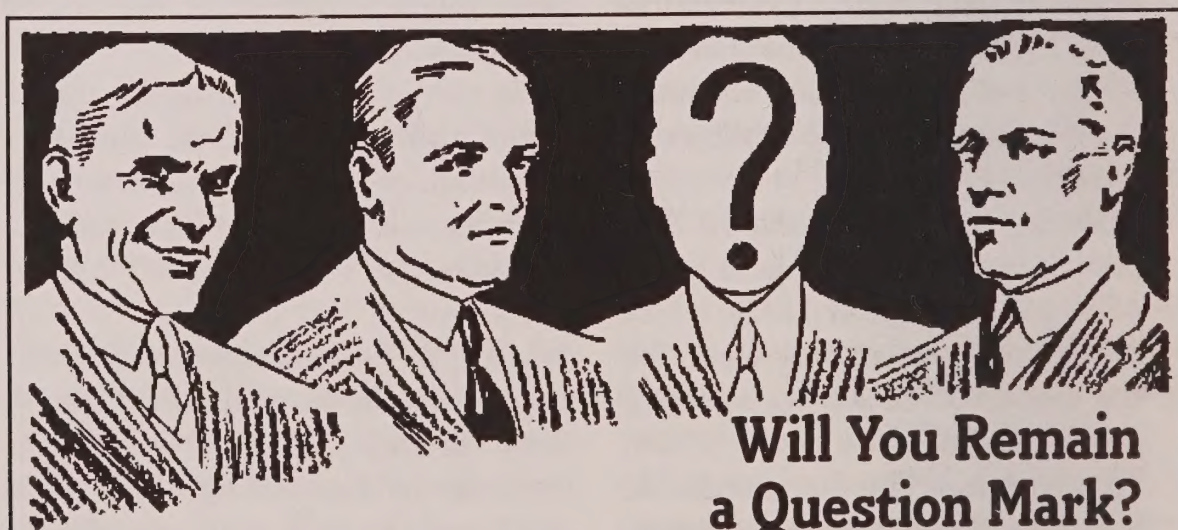
controlled weapon and render its effect nil.

Mr. John Hays Hammond, Jr., claims that no outside radio interference can affect the journey of his vessel or torpedo, and he further states that if a hostile vessel attempts to interfere with his boat that the latter will immediately turn in the direction of the enemy. That sounds bad for the vessel fitted with the new device, if it fails to obliterate-but we shall see.

Mr. Hammond employs, among other things, a time relay for controlling his vessel, thus eliminating most all ordinary radio interference. But the wave length emitted by the Cobbam Obliterator can be changed in a fraction of a second to any wave length desired; and at the same time the wave length is automatically changed from a low time value to a very high time value and vice versa, thus a point is sure to be reached, it seems, where the Radio Obliterator

will strike a wave length and duration of time corresponding exactly to that of the time relay. This causes the desired interference.

We must wait and see the result of the Hammond radio-controlled torpedo when tested with the Cobbam Radio Obliterator. A number of the leading radio and electrical engineers of the country have cautioned the U.S. radio experts not to close their tests on any form of radio-actuated device or torpedo until it has absolutely showed that it can withstand the perfect onslaught of wireless waves of every conceivable magnitude hurled at it by the Cobbam machine. The editors have seen these papers and are heartily in accord with the caution note which they sound. There seems a strong probability that we shall presently see a radiodynamic torpedo doubling back on its course and possibly blowing up either itself or its base control plant. ❶



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THE REFLEX RECEIVER

BY HARRY HYDER

In the 1920s, the most expensive components in a radio set were the vacuum tubes. Not only were tubes expensive, but unlike transformers, capacitors and other parts, tubes had a limited life and needed frequent replacement.

It would be advantageous if the number of tubes in a radio set could be reduced without sacrificing performance. The reflex receiver attempted to accomplish this.

The basic reflex idea was that an amplifier should be capable of amplifying radio and audio frequencies simultaneously since they were far enough apart to be separated by filters. This is certainly true, but there are pitfalls that must be avoided.

Fig. 1 is a schematic of a single-stage reflex amplifier amplifying both audio and radio frequencies. The capacitor labeled "C" is chosen to have a low reactance at radio frequen-

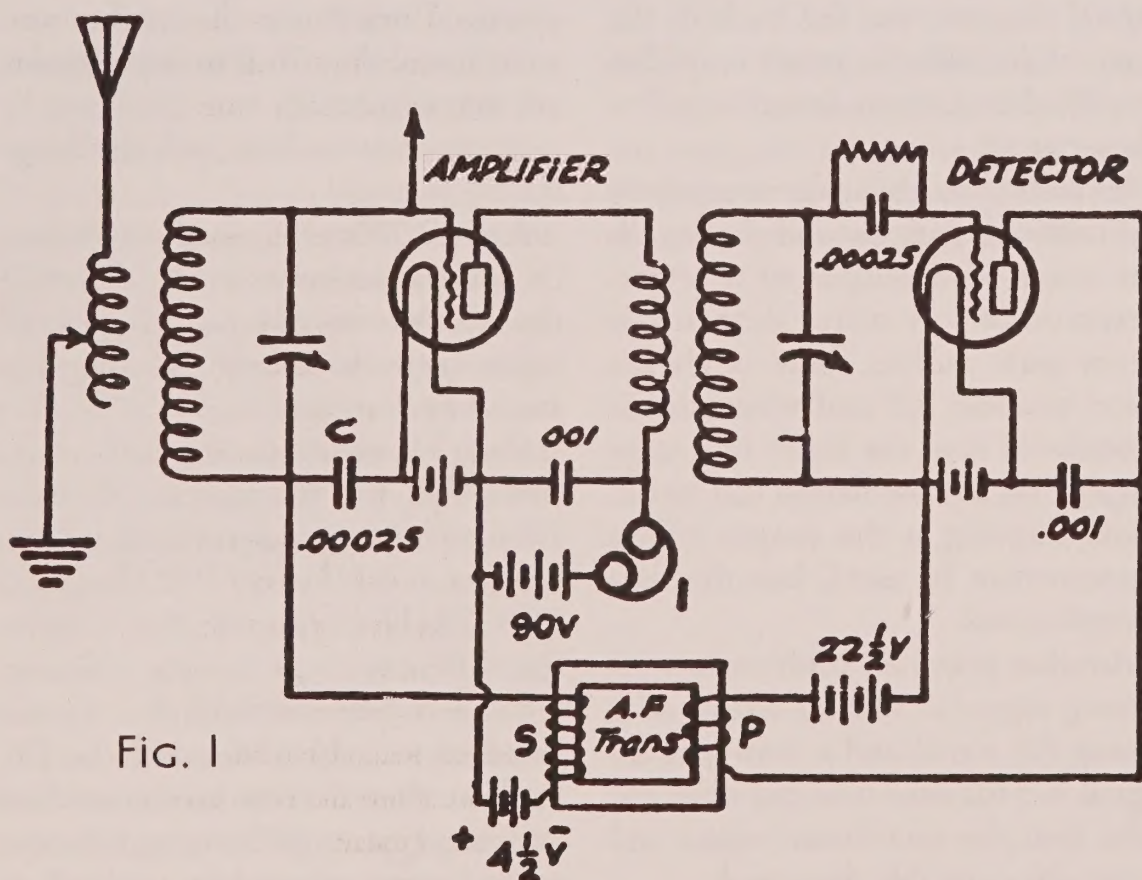


FIG. 1

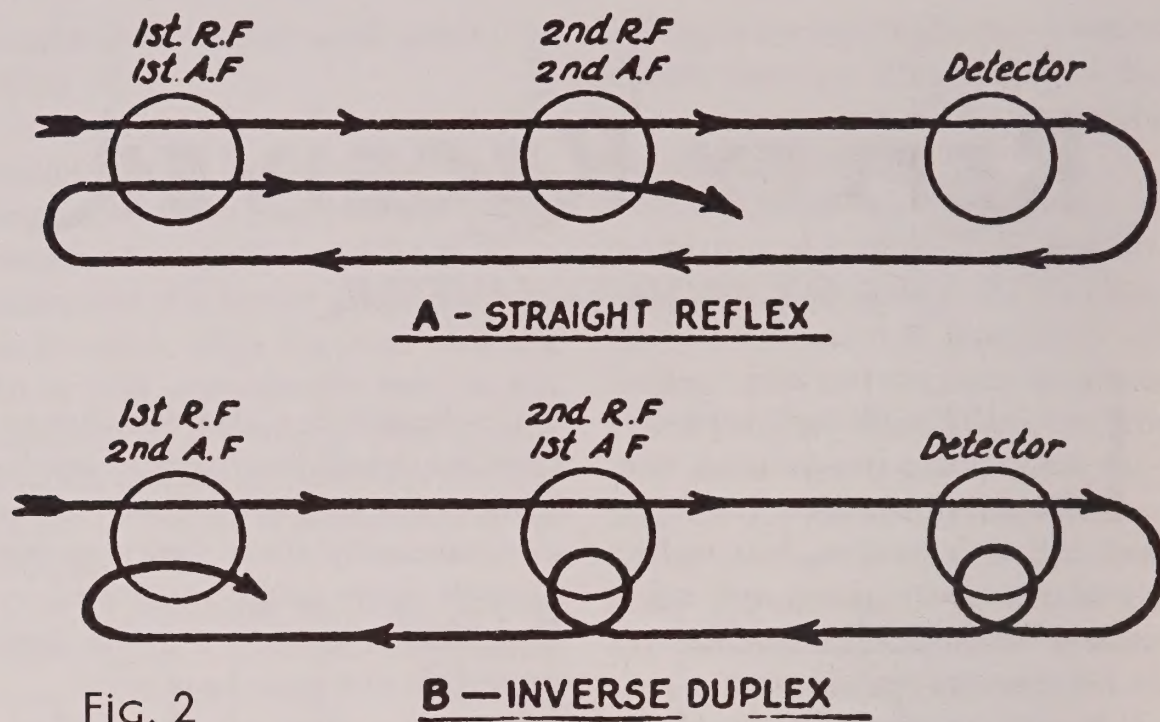


FIG. 2

cies and a high reactance at audio.

The original reflex receiver had a single vacuum tube and a crystal detector. The audio output of the crystal detector was fed back to the input of the radio frequency amplifier, amplified and taken from the tube's plate circuit.

It can be seen that there is a potential feedback path around the amplifier stage. The output of a crystal detector or any other detector is never pure audio; there is always some residual RF and when this is introduced into the input of a stage amplifying RF, oscillation can result. More filtering at the output of the detector can be used, but this is a complication.

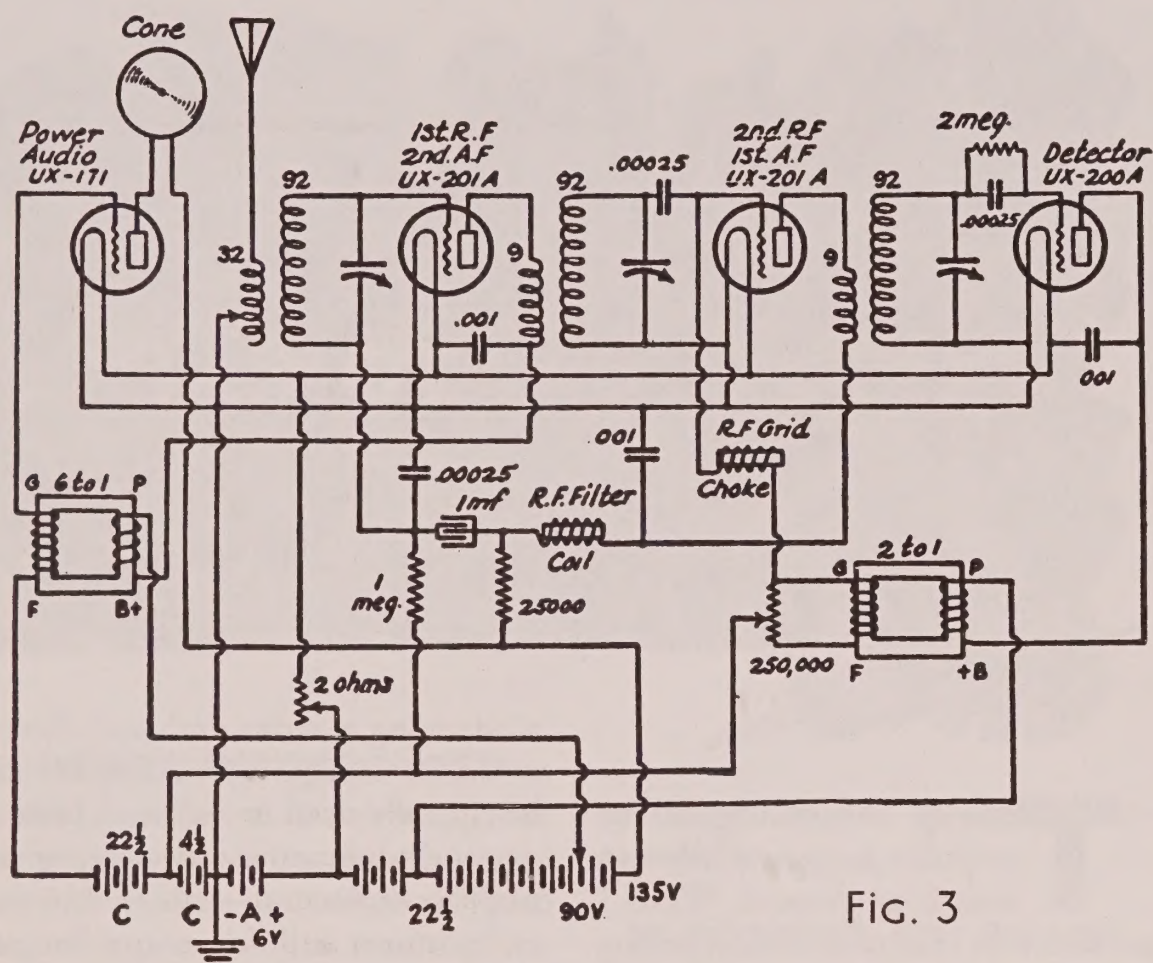
Another potential problem is with strong signals. The addition of a strong RF signal and a strong audio signal in a vacuum tube can drive the tube into the non-linear region and cause objectionable distortion

Reflex receivers were not limited to a single tube; some sets were built that had two vacuum-tube amplifier stages and a tube detector. Some appeared briefly on the market and others were described in experimenter's magazines.

None seem to have had any long-lasting success.

As the 1920s progressed and dozens of companies were manufacturing the ubiquitous 201-A, the price of tubes came down and reflexing lost its chief advantage.

One last reflex set deserves mention. This was the Grimes "Inverse Duplex". It was described in the January and February 1927 issues of QST. The block diagram, fig. 2, shows the difference between an ordinary reflex and the inverse duplex. In the standard set, the audio and the RF, both at their lowest levels, are fed into the first amplifier stage. In the second stage, when they are both at



a high level, there is the possibility of overload and distortion. In the inverse duplex, the audio at its lowest level and the RF at its highest level are both in the stage before the detector. The possibility of overload is reduced. The audio output from this stage is then fed back to the input stage, which also receives RF at its lowest level. Sound complicated? Yes, but Mr. Grimes, the designer, claims that it is a great improvement over the standard reflex. Fig. 3 is a complete schematic of the inverse duplex. The set also has an audio power amplifier using a type UX-171 tube.

The original reflex idea is attributed to Marius Latour of France. It was reported to have had great popularity in Europe, where tubes were more

expensive than in the U.S.A.

The reflex and inverse duplex sets are now just interesting footnotes in the history of radio. Most later texts do not even mention them. ♣



"TO CAP ...

A FEW THOUGHTS ON THE HOWS AND WHYS OF REPLACING CAPACITORS

To "cap" something, in the popular jargon of the rap star, is to shoot it. While I am sure that I am not alone in having had the urge to shoot an occasional uncooperative set, that is not the gist of this article. My intention is to share a few thoughts on how to "cap" a set in the vernacular of the antique radio buff, i.e. replace the capacitors in an attempt to get the radio to play. To that end I offer the following:

WHAT IS A CAPACITOR AND WHY DOES IT FAIL?

A capacitor is two electrical conductors (plates) separated by a dielectric (insulator). The greater the area of the plates and the closer the plates are together the higher the capacitance. In a circuit a capacitor should look like an open circuit to direct currents and a conductor to alternating currents. This simplistic description of a capacitor will take you a long way

in servicing a radio and just about nowhere in designing one! Capacitors are typically used in radios as filters, bypass devices, tuning devices, or as coupling devices.

Capacitors fail for a number of reasons. Electrolytic capacitors fail when they leak the fluid that is used to form their dielectric. Paper capacitors fail when they absorb moisture, which degrades their dielectric and causes them to become leaky. Some capacitors simply "wear out" which means the dielectric has failed due to operation at high voltages and temperatures over an extended period of time. Some capacitors even go open when one of the leads mechanically separates from its connection to its plate within the capacitor. With respect to capacitors the adage "They don't make them like they used to" is good news. Modern materials and methods of construction have made today's capacitors vastly more reliable than any you will find in an antique radio.



... OR NOT TO CAP?

BY DAVE LAMBERT

REPAIR OR RESTORE?

For the sake of this article I will define an electrical repair as fixing the set with modern components without regard to preserving its under chassis appearance. An electrical restoration will be defined as an attempt to get the radio to play while preserving its under chassis appearance as much as possible. In some cases a restoration might be preserving the appearance of a much earlier repair as this may be more interesting than the set itself! A restoration is more time consuming than a repair but may well be worth the time if you are working on a rare and or valuable set. In addition, restoration techniques may just be a better way to repair the set as in the case of the Philco black bakelite condensers. These form the tie points for much of the wiring and things get messy quickly as they are removed. Also "restuffing" an electrolytic capacitor can sometimes be easier than trying to find room

to hang a new unit in already overcrowded chassis.

BLITZKRIEG OR SHARP SHOOTING

The blitzkrieg approach to repairing a set is to replace the electrolytic capacitors and every paper capacitor in sight. I have heard this referred to as "capping" a set which is the inspiration for this article's title. Blitzkrieg is not a bad approach on some sets but it does leave significant alterations in the under set appearance. Obviously if restoration is your goal, you'll want to repair only those capacitors that have failed. This requires troubleshooting (sharp shooting) to find the defective parts. In either case there are several capacitors I recommend paying particular attention to as they are very prone to failure:

1. Any electrolytic capacitor, especially those used as filters in the

power supply. There are some early "dry" electrolytics that may still be good after all these years but for the most part virtually any electrolytic capacitor will be well past its prime. This includes any replacements you might find as many of these repairs are 30-40 years old. Some people advocate "reforming" capacitors and this can work to a degree. However bad electrolytic capacitors can cause transformers to fail and give your expensive globe rectifier tubes a bad case of cherry red plates. If you want to listen to the set replace the filter capacitors!

2. Any capacitor tied directly to the plate or screen grid of a tube. These see high voltage and are often leaky. The classic problem here is the coupling capacitor between the first audio tube and the audio output tube. When this capacitor leaks it changes the bias on the output tubes grid and the audio becomes highly distorted.

3. The rf bypass capacitors on the line cord. If you look at the schematic of some older sets (Philco comes to mind) you will see these caps (usually around .01 to .015 mF) tied from each side of the line cord to ground and in front of the off/on switch! This means the line voltage is across these capacitors any time the set is plugged in. This is a potential fire hazard.

Capacitors that I recommend ignoring are Mica caps and trimmers. These are seldom a problem and almost never need to be replaced. They are very stable and I don't even generally bother to test them.

A modified blitzkrieg approach to capacitor replacement might be to replace the parts described above and then try the set. In the case of a restoration where the set will be routinely played it might be wise to restore these parts even if they test good. The old adage that an "ounce of prevention is worth a pound of cure" comes to mind.

SHARP SHOOTING (TESTING)

The most important tool you can have for testing capacitors is a circuit diagram and parts list. This will tell which capacitors should be tested and which can be ignored (at least initially). The parts list may specify the working voltage, capacitance and if nothing else a part number for the device which might be cross-referenced to an old catalog. Some circuit diagrams actually contain a diagram of capacitor networks (multiple capacitors jammed into a single unit) and some specify voltages at various points in the circuit to make troubleshooting easier.

The second most important tool for capacitor testing is a digital voltmeter or vacuum tube voltmeter. The important characteristic is that the meter have a high DC input resistance so that you can make the measurements discussed below. This can be used to measure DC voltages to see where a leaky capacitor is pulling the voltage down, to test capacitors to see if they are shorted, to observe how the cap charges and to even measure leakage current. Specific tests include:

1. Voltage Measurements – if you have voltages specified on the circuit diagram and the set is safe enough to power up, (reasonable line cord, no smoke, no plates glowing red, transformer not getting excessively warm etc.) verify the voltages and look into any that are significantly off (greater than 15% from the listed value). Remember if you are looking at bias voltages in a grid circuit you must use a voltmeter with very high input impedance or you will get spurious readings. Also if you get what appear to be low readings on the plate or screen of a converter tube don't start a wholesale replacement of parts in this circuit as it is an oscillator and some meters flake out under these conditions.

2. Shorts/Opens/Charging- To test a capacitor to see if it is shorted or to get a qualitative feel for whether or not it is functioning use your meter as an ohmmeter. If you put the meter on the highest resistance range and put a probe on each of the leads of the capacitor you should get a resistance reading that increases until it exceeds the meter's range and indicates an open. Reversing the polarity of the probes should start the process over again. This is simply showing the capacitor charging from the voltage applied by the meter. If you get a resistance reading continuously with the probes in either polarity you have a bad capacitor. The rate at which the capacitor charges (changes resistance with the leads applied) is a function of its capacitance. The larger the capacitance the longer it takes to charge. If you have a new

capacitor of the same capacitance you can compare its behavior to the unit under test as a qualitative indication of its condition. If you get no reading when you touch the probes to the capacitor leads (try both polarities) the capacitor may be open or the value of the capacitance may be too small for your meter to respond while it charges. A capacitor suspected of being open or being grossly off value should be tested on a digital capacitance meter or capacitance bridge to verify its value.

3. Leakage- If your meter can measure current you can also make true DC leakage measurements on the capacitor. Place the capacitor in series with the ammeter and a DC power supply and measure the leakage. Start your meter out at a high current setting and work down as you can fry some meters by pulling too much current through them. The capacitor should show almost no leakage (electrolytic caps may show a little) at its intended operating voltage.

Other useful tools in checking capacitors include a digital capacitance meter and one of the old resistance/capacitance comparator bridges like the Eico 950A. A digital capacitance meter (some multimeters have one built in) can be used to check the value of the capacitor. It will not tell you if the device is leaky so just because its value of capacitance is reasonable does not give it a clean bill of health. I find these are useful for determining the component value of a device whose markings are obliterated, the value

of devices with color codes I can't remember, and for finding the value of one of those little capacitors with the writing so small that only an eagle could read it. The old capacitor checkers are useful in that they can measure both the capacitance of the device and its leakage. If you see one of these at a swap meet, buy it. Remember no matter what method you are using the capacitor must be independent of the circuit whenever it is being tested! If in doubt disconnect one of its leads.

RESTORATION IDEAS: PHILCO BAKELITE BLOCK CONDENSERS

These are used extensively in prewar Philco sets and are tar sealed networks with one or more capacitors, a number of tie points and sometimes a resistor. Get a copy of Ray Bintliff's *Philco Condensers and More* which is available from Antique Electronic Supply. This book details the connections and component values for virtually any Bakelite block condenser Philco ever used. Avoid the temptation to melt the tar from the block as this is messy and counterproductive. Draw yourself a diagram of the connections to the block before disconnecting them. Once the wiring to the block is diagramed and unsoldered remove the self-taping screw that holds the block to the chassis. Note that a star washer is usually installed between the block and the chassis. It is not critical but it will drop into your set and get stuck in the most ridiculous locations if you aren't careful.

To remove the tar from the block I recommend using an X-Acto knife and small screwdriver. Working over a pan, carefully cut around the inside perimeter of the block to loosen the tar. This will require some force and rocking the knife back and forth. Some tar will break out as you do this. Next take the small screwdriver and pry out as much of the remaining tar as possible. Continuing with the screwdriver lift the old capacitors out of the body. Be careful as you pry as you can easily break the Bakelite body. If this happens the broken piece can be easily super glued back into place. The wire from the old capacitors is very fine and should simply be broken off. Once the body of the capacitor is empty, clean out the residual tar by scrapping with the screwdriver followed by scrubbing it with some contact cleaner.

Next clean up the lugs by removing the old solder and wire. A dental pick is very useful for removing the fine wire that connected the old capacitors to its lug. Old time repairmen often cut the lug from the block and wired a replacement capacitor to the dangling lug. If you encounter this you can slice the decapitated lug back to the block by splicing it to its stump with wire wrap wire. I use metalized polyester 600 WVDC capacitors as replacements in Philco Bakelite Block Condensers. If the 600 WVDC part is too large to fit in the block I use the 400 WVDC version. For the Bakelite block connected to the line cord, which contains the rf bypass capacitors, I like to use .01 MFD. ceramic disc capacitors rated at 2

kV as a fire prevention method. These might require enlarging the existing holes in the Bakelite block to allow the leads to push through. The replacement capacitors leads are bent, fed through the holes in the block and then connected to the appropriate lugs. There is no need to replace the tar in the block, as it is not seen when the block is reinstalled. Once the block is reattached to the chassis and the wiring is reconnected, the set will look "like old", which is your objective.

REBUILDING CANNED ELECTROLYTIC CAPACI- TORS AND CAPACITOR NETWORKS

Rebuilding canned electrolytic capacitors or a group of capacitors (network) housed in a single can be time consuming. However it does result in a chassis of identical appearance to the original when properly performed. In addition it can be hard to find a place to hang replacement capacitors in a crowded chassis so restuffing the can might still be a desirable option. The first order of business is to determine the nature of the unit (how many capacitors? what values of capacitance and working voltage? what is the common connection and is it tied to the metal can? etc.) Avoid the temptation of significantly increasing the capacitance of the filters in your set. (Old radios did have a low level of hum when they were operating properly!) Next you need to get the can open. This is generally best done at the base of the unit. Some units can simply

be pried open but most will need to be cut open. Before cutting the can open, scribe a mark across what will become the two pieces. This will be used to align the pieces when they reattached. I use a coping saw to cut the soft aluminum of the can and I find it useful to draw a guideline around the can. The cut should be made just above the point where the bottom insulator containing the lugs is crimped in. Occasionally the guts stay attached to the bottom piece of the capacitor. If this is your lucky day and this happens all you will need to do is to cut these guts away from the lugs and rinse the can out with contact cleaner. The usual result is that the guts are firmly lodged in the can and need to be extracted. Carefully drill two quarter inch holes about one half inch apart into the "gunk" as deep as possible without puncturing the can. Next jam the blades of a pair of needle nose pliers into these guts and try to pull and spin the mass until you can remove it from the can. Most of the time it will come out in one lump but sometimes it takes multiple bites. Clean the can and set it aside.

Next the replacement capacitors that will go back into the can must be configured. Even though the modern capacitors are smaller, it can be a bit of a trick to stuff multiple units back into the can. It may be necessary to drill small holes in the insulator base to attach the replacement capacitors to their respective lugs. This is because the internal connections to the lugs are often aluminum and can't be soldered. I drill these small holes

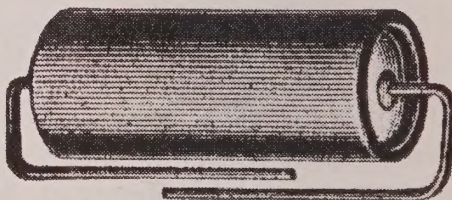
with a Dremel tool. The appropriate lead is fed through each hole and is externally wrapped around the lug. Internally, heat shrink tubing is used where necessary to prevent shorting. Once you have duplicated the required capacitances and made it fit back into the can, it is time to glue or crimp the base back to the can.. I use J-B Weld (J-B Weld Company) for this purpose and it has always worked well. Don't forget to realign the marks you made earlier and give the glue enough clamp time to set up properly.

PAPER CAPACITORS

The only good reason to restuff a paper capacitor is the restoration of a valuable set. The way I do this is to trim the leads flush with the ends of defective unit and drill a concentric hole through the body

that will snugly fit the replacement capacitor. As the replacement unit will not fill this entire cavity I fill it back up with wax, hot glue or silicone to preserve the original appearance. Once the part is reinstalled the unit will function better than new and still have the correct appearance and markings.

I hope anyone who has persevered through these ramblings has picked up a useful idea or two. Next time you are "capping" a set, and whether you are from the school of Blitzkrieg or a Sharpshooter, try "restuffing" some capacitors. I think you will be happy with the result. ☪



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